CHAPTER I

OPERATIONAL PROCEDURES

A. GENERAL

Operational procedures take two steps, that of analysis and forecast aids, in the preparation sequence prior to issuing the warning. Within the Fleet Weather Central/Joint Typhoon Warning Center (FWC/JTWC), the basic analysis is the responsibility of the Fleet Weather Central (FWC). Micro-analysis, forecast aid evaluation, and the warnings as described below, are the functions of the Joint Typhoon Warning Center (JTWC).

B. ANALYSIS - FWC/JTWC

1. Types of contour and/or streamline charts with standard times:

   a. Surface, 0000Z, 0600Z, 1200Z and 1800Z.
   b. Gradient level (2,000 to 3,000 ft above ground) 0000Z and 1200Z.
   c. 850mb, 0000Z and 1200Z.
   d. 700mb, 0000Z and 1200Z.
   e. 500mb, 0000Z and 1200Z.
   f. 300mb, 0000Z and 1200Z when required by JTWC.
   g. 200mb, 0000Z and 1200Z.
   h. 100mb, 0000Z and 1200Z when required.

2. Cross Sections:

   a. Checkerboard or Stidd Diagram.
   b. Time Cross Sections analyzed for θe.
   c. Space Cross Section.

3. Micro-Analysis:

   a. Sectional charts, hourly and 3 hourly, as required.
   b. Reconnaissance reports.

4. Single and Double Space Mean Charts at 500mb with the M-2 field.

5. Easterly Wave Continuity Graph.

C. FORECAST AIDS

These are listed in alphabetical order so a priority of importance will not be established.

1. Climatology

Once a tropical cyclone has been detected, the first step in preparing to issue the initial warning is to lay out a track based on climatology. This track is laid out on the top acetate of the work chart described below so as to extend it 4 or 5 days at the speed indicated by climatology. Next, the track is modified in accordance with the existing and forecast upper-air pattern, after which the initial warning is prepared and issued. The forecast track is extended and modified with time, as reconnaissance fixes are received and the synoptic upper-air pattern changes.

The finest compilation of typhoon climatological data for the past 78 years is contained in the publication of the Royal Observatory Hong Kong, "Tropical Cyclones in the Western Pacific and China Sea Area." See 10 years of JTWC monthly best tracks in Chapter V.

2. Computer Products

In 1962, the prognoses FU-AS, PH, CI and JP54 Series, product of NMC were used extensively. Long Wave positions and prognoses were received from FNWF. Zonal Index computations are still expected from FNWF and will be evaluated as a forecast aid during the 1963 season.

FNWF and NMC provided the typhoon computer position forecasts in 1962, though irregularly received from the latter. Computer positions were considered for direction and/or speed of movement.

3. Coordination

Coordination with other U. S. agencies is routine to obtain their considerations prior to issuance of a warning. When a circulation for which warnings are being issued is N of 25N, Fuchu Air Force Weather Central transmits coordination forecasts twice daily to JTWC. Coordination with

other Air Force and Navy activities is on an "as required" basis, depending upon the location of a particular tropical cyclone.

4. Statistical Methods

See Chapter V for research paper on the Miller-Moore and Arakawa 1962 evaluations.

5. Steering

See Chapters III and IV.

The space mean chart, as discussed herein, is a brief on how it is used at FWC/JTWC. The chart is constructed from the 500mb chart and has the single, double and the M-2 field thereon. During the Typhoon Season, the chart is produced as needed except that between July and November it is constructed twice daily. One great advantage of the chart is that it more nearly portrays that portion of the atmosphere under consideration on one chart than does any other analysis or system of presentation.

The chart is useful for steering S of the ridge line under the following conditions:

a. When the typhoon is moving along the southern periphery of a large quasi-stationary anticyclone, the single space mean may act as a steering tool between 10N and the ridge line.

b. When the synoptic features are performing consistently, a prognostic chart can be constructed from the single space mean to be used as a steering tool from 10N to the ridge line.

c. The double space mean with the M-2 field is usually more reliable than the single space mean above 20N.

The space mean will usually aid in forecasting the point of recurvature but should be used with caution. On large typhoons, this point may be a degree or two N of that indicated by the space mean chart.

After a typhoon recurves, the chart is used to forecast its movement in a similar manner to that of forecasting the movement of extratropical systems.

It is emphasized that the space mean chart is another tool, one of many, and usually cannot be successfully used as the sole device for making typhoon trajectory forecasts.

The space mean chart is used in conjunction with the long wave patterns that are produced and provided by FNWF. They aid in determining the conditions of the major atmospheric features in the Northern Hemisphere and as a guide to the changes that may be expected. These patterns provide a substantial background upon which to base typhoon forecasts.

6. Surveillance Systems

See Chapter II for evaluations of aerial reconnaissance, land radar, and satellites.

7. Wachholz Graph

This is a graphical correlation of measured and observed eye meteorological parameters to maximum surface wind as collected by reconnaissance aircraft. JTWC plans to recompute and readjust the presentation of this graph during 1963.

8. Work Chart

This is an operational and recording tool in preparing tropical cyclone warnings. The basic chart is from the Pacific Airways Plotting Chart series, plus 3 acetate overlays. All aircraft and radar fixes are plotted on the basic chart. Twenty-four hour forecast positions are plotted on the bottom overlay, warning positions are plotted on the second overlay, and the top overlay is utilized as a work sheet. Green, red, and black china marking pencils are used on the three acetates for instantaneous visual reference.

D. WARNINGS

Warnings are filed and transmitted every 6 hours at

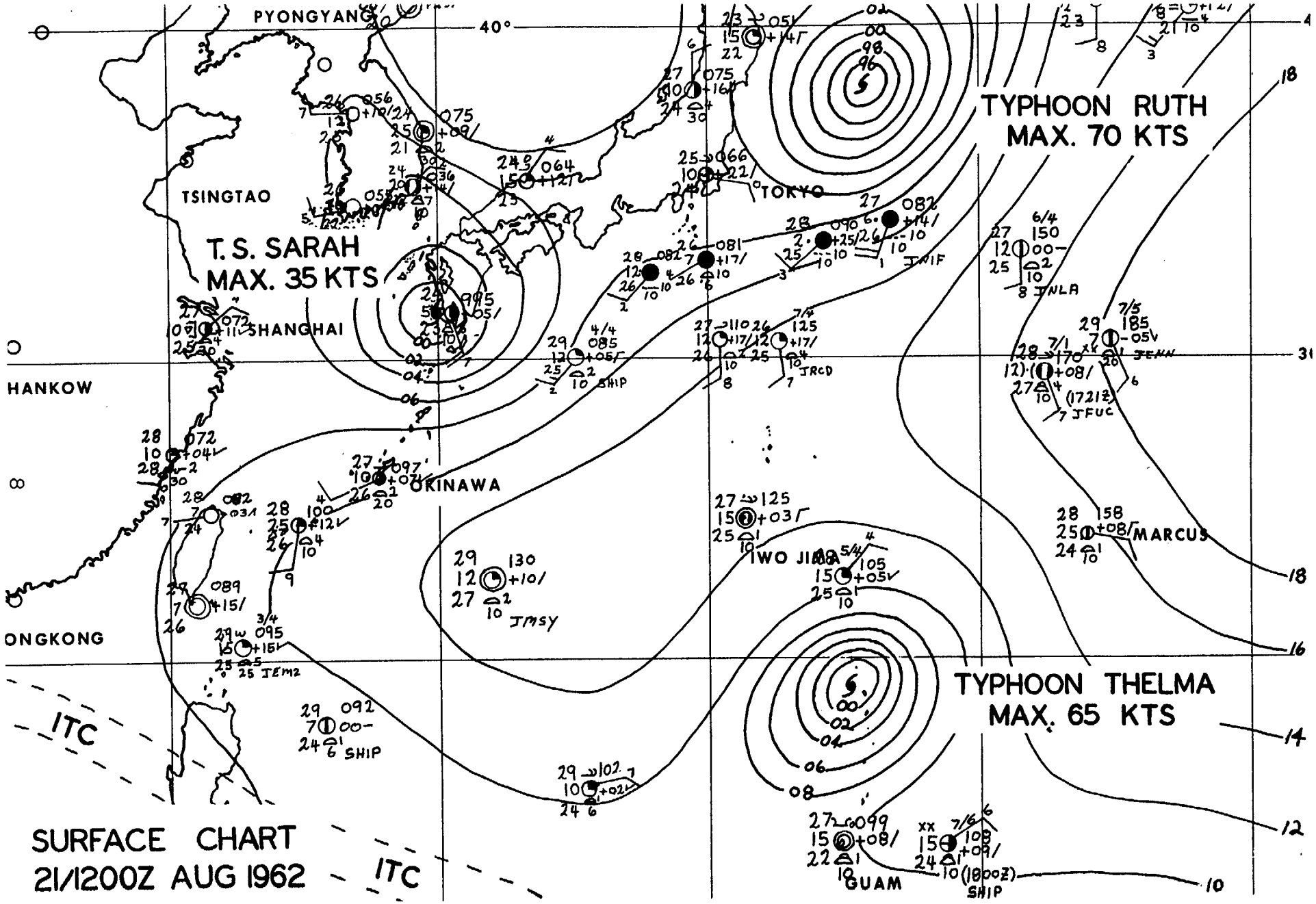
synoptic times of 0000Z, 0600Z, 1200Z and 1800Z. In accordance with CINCPAC INST 3140.1D, the message contains the present warning position of the tropical cyclone being valid for the scheduled transmission time. This connotes that the 24 and 48-hour warning forecast positions are actually 30 and 54-hour forecasts from the last surface synoptic time.

The warning position of a tropical cyclone is actually a short range forecast from the last "best" position. The last "best" position is usually about 2 hours old based on land radar, 2 to 3 hours old based on reconnaissance fixes, 3 to 6 hours old based on surface synoptic reports, or 6 to 12 hours old based on upper-air synoptic reports. It is for this reason that the 0600Z warning, for example, may not agree with the position of the tropical cyclone as indicated by the 0600Z analysis. Amendments are issued when this difference is significant.

The numbers of tropical warnings run consecutively regardless of whether the cyclone is upgraded or downgraded from tropical depression, tropical storm or typhoon. If warnings are discontinued and the circulation regenerates, the new series of warnings are numbered consecutively from the number of the last warning of the previous series. As required, amendments and corrections are issued, and these are numbered the same as the warning which they amend or correct.

The 1962 Verification Summary is contained in Chapter III.

All 24 and 48-hour forecasts made when a tropical cyclone is of tropical storm or typhoon intensity are verified against the "best" tracks at all latitudes through the last warning issued.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SHANGHAI
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TYPHOON RUTH
MAX. 70 KTS
OKINAWA
IWO JIMA
MARCUS
ONGKONG
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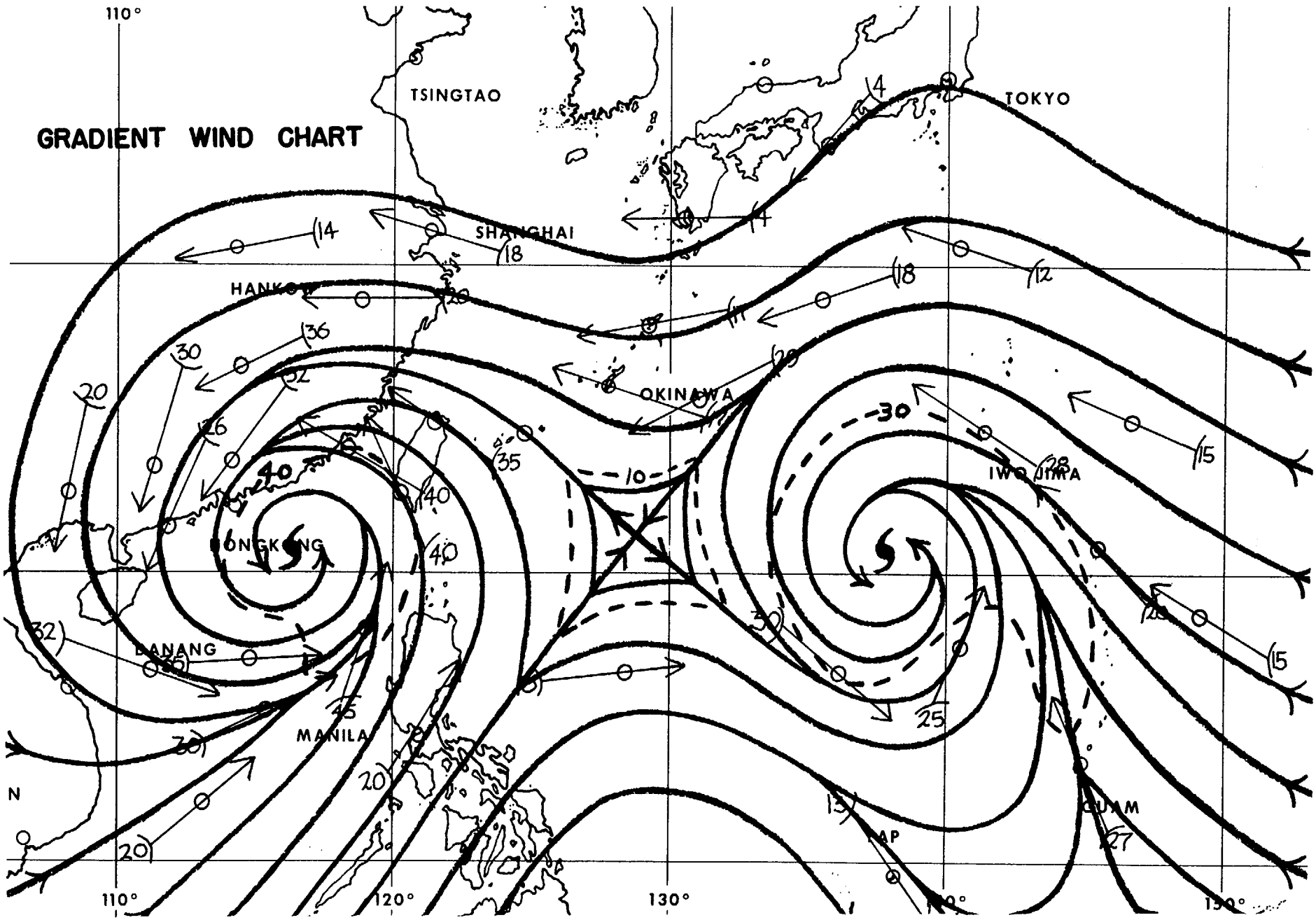
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FWC/JTWC GUAM

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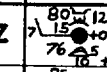
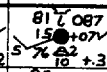
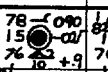
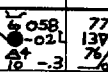
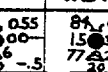
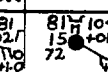
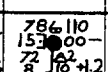
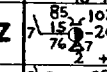
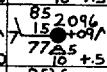
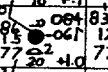
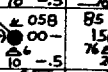
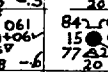
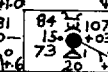
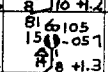
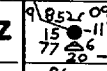
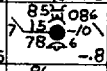
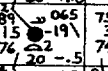
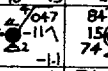
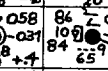
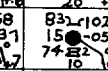
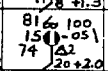
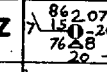
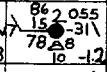
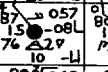
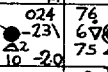
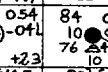
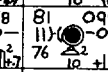
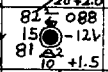
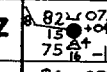
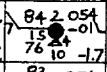
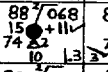
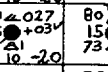
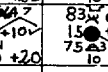
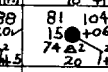
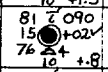
08/2100Z								
09/0000Z								
09/0300Z								
09/0600Z								
09/0900Z								
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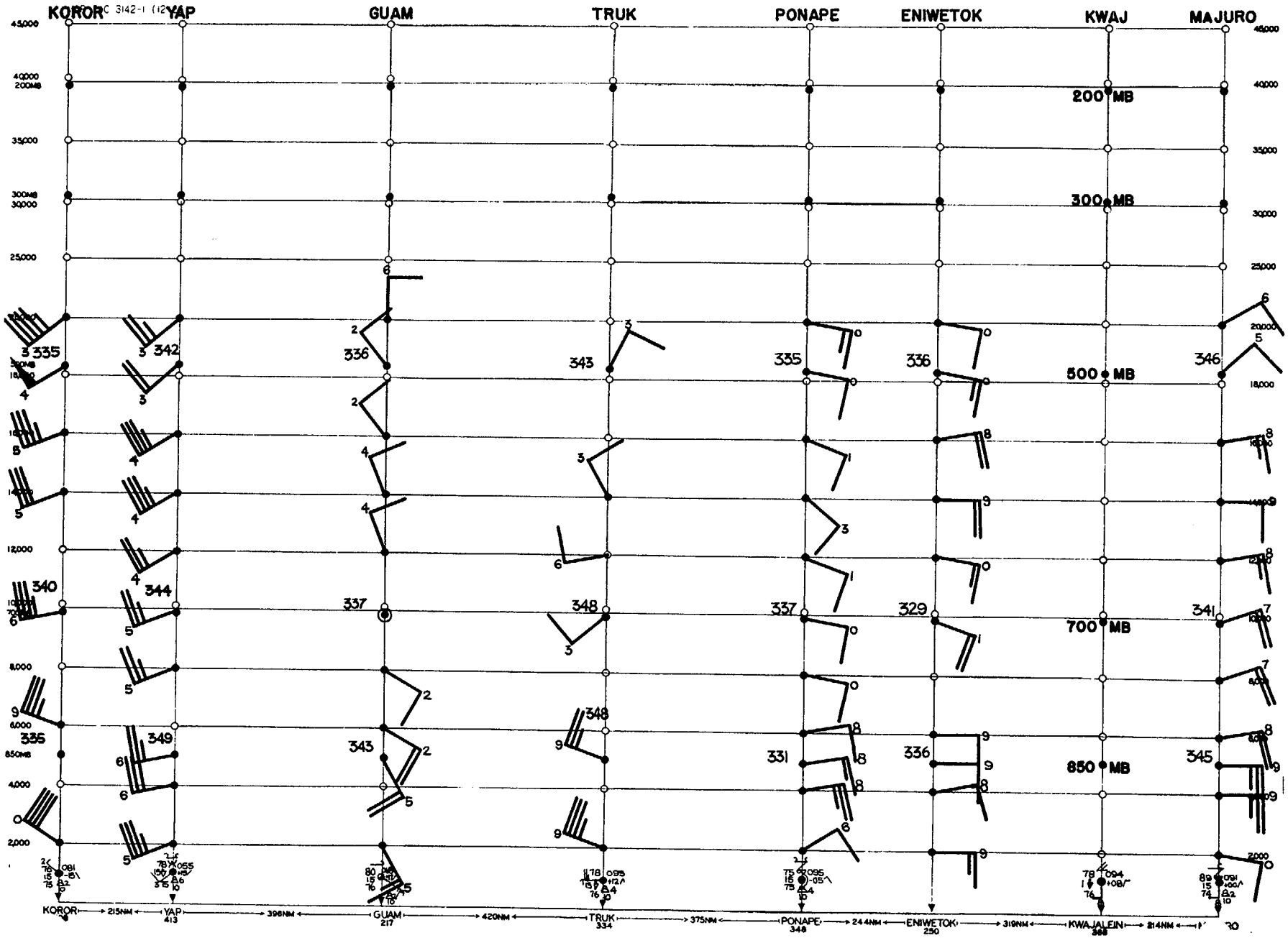
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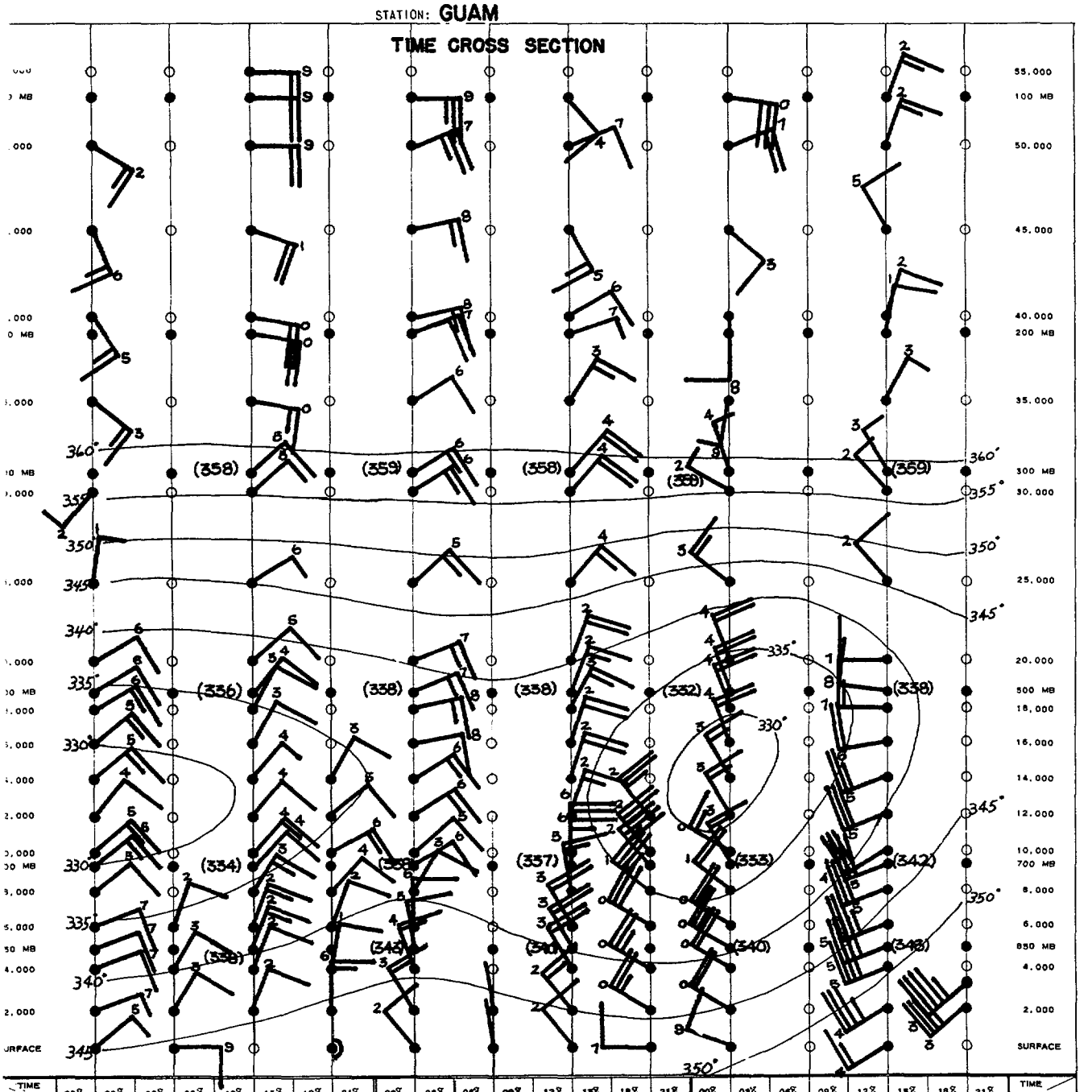
STATION: **GUAM**

TIME CROSS SECTION



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app	+03	-02	-08	+05	+10	-07	-19	+12	-02	-12	-17	+05	+05	-1.9	-1.4	+05	+01	-1.2	-07	+10	+1.2	-02	-08	+1.4	app
RR																.61	.24				.41				RR
Δ P	-0.2	-0.2	-0.5	-0.6	-0.6	-0.2	-1.9	MISG	-1.6	-2.8	-2.9	-2.9	-3.4	-4.3	-3.6	-4.2	—	-2.4	-2.3	—	-1.1	±0.0	+0.5	+0.4	24 HR Δ P
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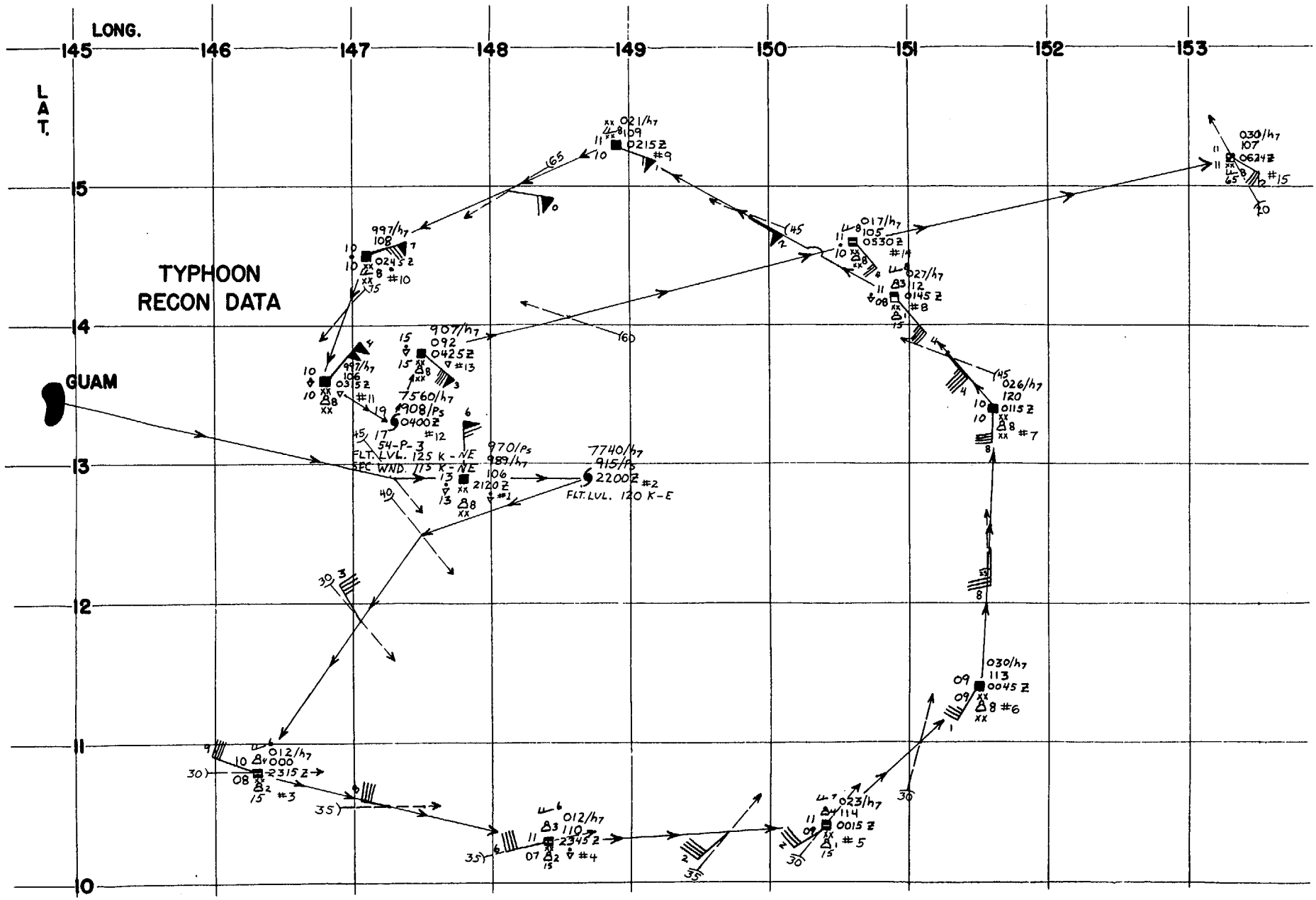
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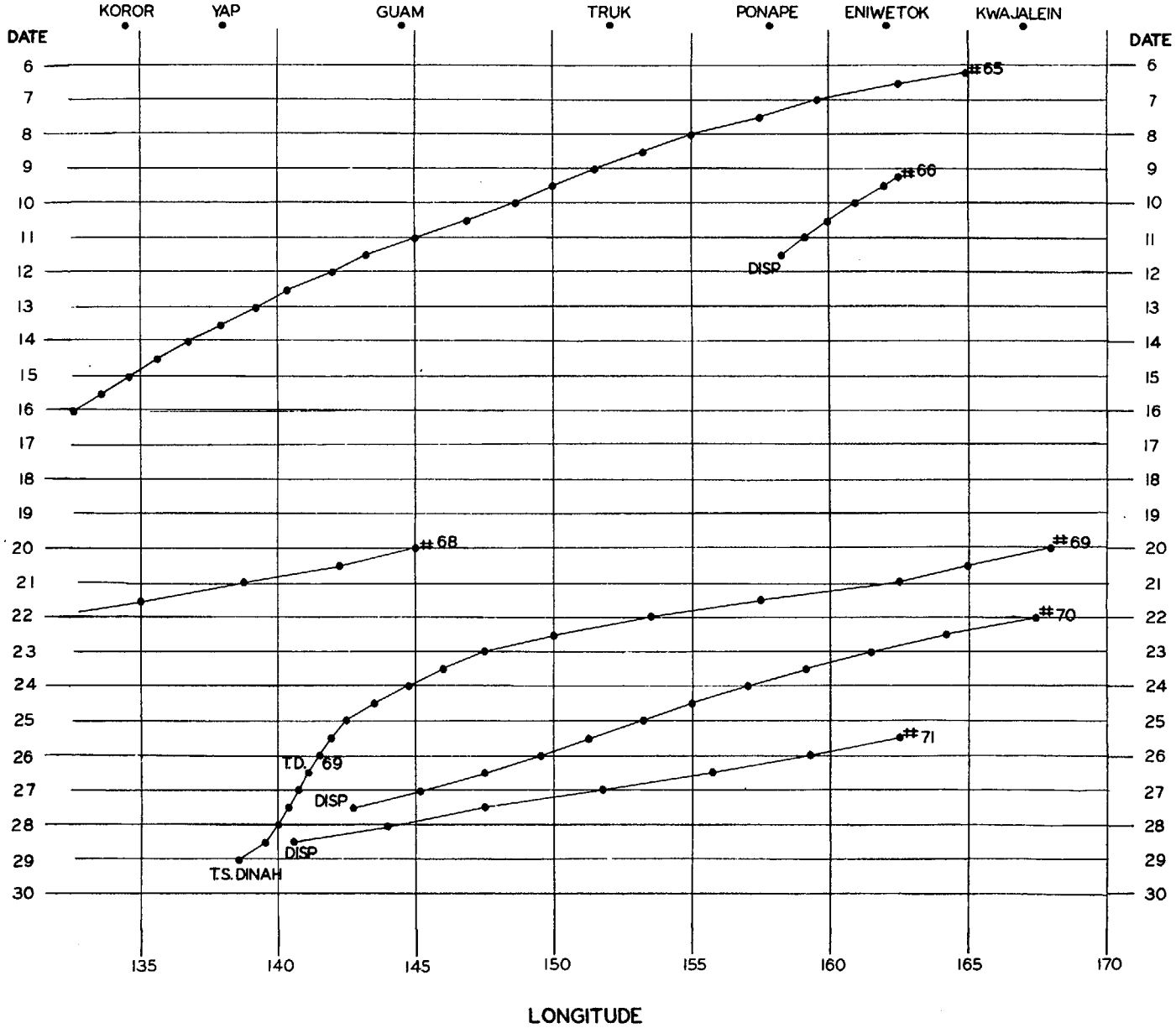
0215Z
#9
997/h7
108
0245Z
#10
907/h7
092
0425Z
#13
997/h7
106
0315Z
#11
7560/h7
908/Ps
0400Z
#12
54-P-3
FLT. LVL. 125 K - NE
SPC WND. 115 K - NE
970/Ps
989/h7
106
2120Z
#1
7740/h7
915/Ps
2200Z #2
FLT. LVL. 120 K-E
017/h7
105
0530Z
#14
027/h7
112
0145Z
#8
026/h7
120
0115Z
#7
030/h7
107
0624Z
#15
030/h7
113
0045Z
#6
023/h7
114
0015Z
#5
012/h7
110
2345Z
#4
012/h7
000
2315Z
#3

CONTINUITY GRAPH



500 MB LONG WAVE ANALYSIS AND 48 HR PROG